Name:

# Genetics Problem No.1

A heterozygous short haired cat is crossed with a long haired cat. The expression of the short haired allele is dominant over the expression of the long haired allele. What is the chance (probability) of producing a short haired kitten? Show all working below.



**Define allele symbols**:

**Short =**

**Long =**

**P phenotypes** x

**P genotypes** x

**P** Ova/sperm punnett square

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**F1 genotypes**

**F1 phenotypes**

**Answer =**

**Genetics Problem No. 2**

In mice grey coat color is dominant to black.

a.What **symbols** could be used to represent the alleles for these coat colours?



b. If a pure-bred grey mouse is bred with a black mouse, set out the genetic cross showing all phenotypes and genotypes in the P and F1 generations.

c. A pet shop owner only wants to sell black mice, because they are worth more money than grey. What phenotypes and genotypes of the parents would guarantee only black mice in the offspring? Explain fully.

# Genetics Problem No.3

**Albino (white) coat color in rabbits is recessive to brown coat color.**

a. What **symbols** could be used to represent these coat colors?

Brown =

Albino =

B What **genotypes** are possible if a rabbit has a

Brown coat =

Albino coat =

c. A brown rabbit that had one albino parent was crossed with another brown rabbit which also had one albino parent. What are the expected proportions of genotypes and phenotypes amongst the offspring (F1) resulting from this cross.

**Show all working below**

**Genetics Problem No.4**



Feather color in Andalusian poultry is determined by **incomplete** inheritance. The most prized fowls are blue in color and they are known to be the heterozygous.

When blue fowls are allowed to breed with each other, they produce offspring that are **either** black, blue or whitish.

a. **How many phenotypes** are there for feather color in Andalusian poultry?

1. What **symbols** could be used to represent the alleles for these coat colors? (Hint: there are only TWO alleles)
2. Write down the **genotypes for each of the phenotypes**.

d. A black fowl is mated with a whitish fowl. Complete the following to show phenotypes and genotypes of their offspring (the F1).

# Genetics Problem No.5



**In guinea pigs rough coat is dominant to smooth coat.**

1. What **symbols** could be used to represent the alleles for these coat types?

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b. If two heterozygous rough-coated guinea pigs are mated, what types of genotypes and phenotypes would you expect? Show all working.

A rough-coated guinea pig is bred to a smooth one, giving 8 rough and 7 smooth offspring in the F1.

c. Complete the cross below to show phenotypes and genotypes for the parents and the F1 generation.

**Genetics Problem No. 6**

This pedigree shows a recessive pattern of inheritance for albinism. (Albinos have no colouring pigment in their hair or skin.)

1. How many generations are shown in this pedigree? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. How many males and females in this pedigree are albino?\_\_\_\_\_\_\_\_\_\_\_
3. When two albino parents have children, are all their children albino? Explain

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1. In the second generation, a male albino and a normal female had three normal children. If they had another child, what is the probability that it would be albino?
2. Using the correct symbols, draw on the pedigree an albino male in the fourth generation having 2 children with a normal homozygous woman. The first born child is a girl and the second a boy.
3. What evidence is there in this pedigree that albinism shows a recessive pattern of inheritance? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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# Genetics Problem No. 7



In tomatoes **red fruit color is dominant to yellow**. Suppose a tomato plant homozygous for red is crossed with one homozygous for yellow.

## Determine the appearance (phenotype) of the F1, and the F2

To produce the F2, plants from the **F1** were allowed to interbreed.

Show all working.

# Genetics Problems No. 8

1. **Colored coat in mice is dominant to white colored mice.**
2. If a pure-bred colored mouse was mated with a pure-bred white mouse, what genotypes and phenotypes would there be in the offspring? Show all working, including a punnett square.



1. If two of the offspring mated, what colour will their children be and what **ratio** of coloured mice to white mice will result. Show all working. Show all working, including a punnett square.
2. Right-handedness is dominant to left-handedness. If a heterozgous right-handed person married a left-handed person, what is the **probability** of their children being left-handed? Show all working, including a punnett square.

# Genetics Problem No. 9

On a sheep farm in the Mallee for over ten generations most of the sheep bred there have been white. Occasionally though, a **white ewe** has given birth to a black lamb. Whenever two black sheep breed, only black lambs are born. When pure-breeding white sheep are crossed, they only produce white lambs. However, some white sheep, when crossed, regularly produce both white and black lambs.



1. What is another term for pure-breeding?
2. What are the phenotypes for sheep coat color?
3. Write symbols to represent the alleles for coat color.
4. Write down the genotypes for each of the following:
5. the pure-breeding white sheep
6. a white sheep that produces black lamb
7. black sheep
8. Complete the following cross to show a mating between two heterozygous white sheep. Write down the expected proportions of phenotypes in the offspring.

# Genetics Problem No. 10

# Straight hair is dominant to curly hair in mice.

Two different matings were set up

I homozygous straight haired male with a curly female

II a heterozygous straight haired male with a curly female

A State a symbol for

the straight haired allele \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

the curly allele \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_



b What are the genotypes of each of the parents in each of the matings?

I \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

II \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

C Use 2 punnet squares to work out the genotypes and phenotypes of the offspring of each cross

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Offspring genotype\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Offspring phenotype\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

II

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Offspring genotype\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Offspring phenotype\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

# Genetics Problem No. 11

The length of tail in cats is an example of Dominance inheritance and also a lethal genotype. The symbol for long tail is Tm and the symbol for no tail is TM. Cats with genotype TMTM die before they are born. Cats with genotype TMTm are called Manx cats and have a very short, stumpy tail and cats with genotype TmTm have a normal tail length.



If two manx cats mate what is the probability (chance) that any kitten will have a normal tail? Will the litter be of normal size? (A litter is the number of kittens born at the same time to one mother.)

Show all working, including a punnett square.

**Genetics Problem No. 12**

When long radishes are crossed with round radishes, all the offspring are oval. If these oval radishes are then crossed (bred) with one another, what would you expect the next crop (F2) of radishes to be like?

(Assume the shape of radishes is determined by intermediate inheritance.)

#### Show all working